ABSTRACT OF THE DISCLOSURE

An acoustic monitoring method and system in laser-induced optical breakdown (LIOB) provides information which characterize material which is broken down, microbubbles in the material, and/or the microenvironment of the microbubbles. In one embodiment of the invention, femtosecond laser pulses are focused just inside the surface of a volume of aqueous solution which may include dendrimer nanocomposite (DNC) particles. A tightly focused, high frequency, single-element ultrasonic transducer is positioned such that its focus coincides axially and laterally with this laser focus. When optical breakdown occurs, a microbubble forms and a shock or pressure wave is emitted (i.e., acoustic emission). In addition to this acoustic signal, the microbubble may be actively probed with pulse-echo measurements from the same transducer. After the microbubble forms, received pulse-echo signals have an extra pulse, describing the microbubble location and providing a measure of axial microbubble size. Wavefield plots of successive recordings illustrate the generation, growth, and collapse of microbubbles due to optical breakdown. These same plots can also be used to quantify LIOB thresholds.